AMATEUR SATELLITE REPORT

AMSAT's Newsletter for the Amateur Space Program.

Number 62
September 7, 1983

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AO-10 Operations In Full Swing; Response Is Widespread

The Phase III era got under way 6 Aug. when AO-10's Mode B transponder was turned on. Thousands of experienced amateurs around the world were poised at their radios for the first sounds of the transponder. Then the moment came. Tentatively at first. Perhaps weaker than anticipated. But there it was: AMSAT-OSCAR 10, Mode B!

The signals were down a bit for the first few days since reorientation from the second kick motor firing attempt to the orientation for operations remained incomplete. The omni-antenna which was selected for use in the first few days reduced the downlink signal noticeably. Consequently, only the stronger stations were heard for the first few days.

A few discouraging words were heard. "Is THIS all we can expect?!" A calming word came from official reassurance that much improvement was in the offing and that only a few days stood between the operators and a perfectly aligned spacecraft. Moreover it was decided to place the 2-meter high-gain array on-line to increase the downlink signal strength.

The results were at least as expected. In the second half of August hundreds and thousands of jubilant experimenters and satellite veterans alike joined in the fun. Mode-B was showing its best. Apparently the only disappointment was the 214 minutes per orbit that the transponder was turned off. This was done, officials explained, to allow available spacecraft power to be allocated to the power-intensive process of magnetorquing. This is the process of orienting the spacecraft using powerful electromagnets which interact with the geomagnetic field to produce a torque. This force acts to change the satellite's orientation to the desired one. Many stations reporting hearing the slight QSY of the cw beacon during the magne-torquing process. It occured between perigee minus 107 minutes to perigee plus 107

ASR *Returns With AO-10 Flying High*

ASR is back from vacation! The summer has been an especially hot season throughout the USA. The whole Northern Hemisphere seems to have shared in the heat this year. But the launch of AMSAT OSCAR 10 last 16 June has made this a memorable summer for more than just the heat!

With nearly 3 months behind it since launch and more than a month of Mode B operations accumulated, certain patterns in operation are beginning to emerge. Satellite communicators are becoming accustomed to the orbit and its movement across the skies. Station capabilities are being refined. Upgrades to stations are apparent with a high level of sales in preamps and antennas reported by manufacturers and distributors.

ASR has been on vacation for a few weeks following the very Special Edition *ASR* #60/61. The period from a month or two prior to launch to the present have been especially busy for the *ASR* Editors. Several have other "jobs" which require attention too. Thus, with the launch accomplished and many of the associated activities settling down to a routine, *ASR* can return to its regular bi-weekly schedule you've come to expect and enjoy.

Many important stories have coincided with the AO-10 launch campaign. Because of space limitations some important stories have been preempted by AO-10. We'll try to bring you up to date on a few of the on-going stories of interest in this issue.

So sit back and enjoy this issue of *ASR*. Besides bringing you up to date on AO-10 and all the excitement it is generating, we'll update you on STS-9, UO-9, AO-8, LANDSAT D Prime, Ham-Com and other important happenings during this most important summer in AMSAT history!

minutes, or, in terms of the position on orbit, from Mean Anomaly 216 through 040. The action thus occurs at perigee (Mean Anomaly 0) plus or minus 40 counts where the maximum count is 256. Apogee is at 128 counts of Mean Anomaly. The MA (Mean Anomaly) clock can be monitored on the General Beacon as part of the cw transmission each half hour on 145.810 MHz.

Careful measurement of frequency and sensitivity were made by several stations during the first week of operation. K1HTV provided the revised frequency translation and Special Service Channel frequencies that appear elsewhere in the issue. Tests by WA2LQQ in late August showed as little as two watts EIRP would result in a readable downlink with the satellite at more than 30,000 km and a moderately loaded passband.

The theme of QRO operations on AO-10 was raised early. A few very strong signals were operating with signals that can only be described as an embarassment. A few were so loud as to cause the satellite receiver agc to cut back overall sensitivity. As expected, this resulted in a lowering of the entire passband output so that the weaker signals dissappeared form the downlink entirely! Fortunately, several of the offending stations were apprised early regarding their QRO operations and, being generally a bright bunch wishing to exhibit the pioneer cooperative spirit, backed off on the gain. This had the desired effect although one EMEer was heard to exclaim rather poignantly, "But I was only running a watt and a half!" What he didn't mention, we know, was that his 35 dB gain dish was doing its job quite well pushing him above 10 kW EIRP!

Others remain to be convinced, however. Discussions on how to cope with the occasional renegade, the incorrigible, have generally avoided police actions. Official Observer reports have found little favor as well. What has emerged is a program of education and peer pressure to convince the offender that his continued QRO operation will only reduce his standing in the views of others on the satellite rather than the oft-hoped-for ego boost of being told, "You're the loudest thing on the passband." The thrust of the recommendations discussed by AMSAT officials is to make that kind of statement distinctly negative. Thus if it becomes a minor insult to be known as "the loudest on the band", perhaps the alligators will grow better ears, so the theory goes. WØPN says he believes the problem with the occasional EME station is that most have concentrated heavily on their 70 cm stations to the utter neglect of two meters. So while they can radiate enormous amounts of rf on the uplink, they can barely hear at all on the two meter downlink. In any case, several other approaches are being considered in the effort to promptly curtail QRO operations by the uninformed or careless.

One suggestion which has the support of leaders in Europe and America is the idea of a QRP day. After some discussion it has been decided, according to W3GEY and DJ4ZC that Mondays (UTC) shall be QRP day. The maximum power radiated on UTC Mondays hereafter shall be limited to 50 to 100 watts EIRP. These levels will be reviewed after a trial period to see if a further downward push of the power limit is warranted according to W3IWI. The exercise is designed to encourage sound engineering of the receive side of the station according to WA2LQQ.

"I'm really amazed at how well one can hear with a little care for the details," suggested WA2LQQ. "Surprisingly too, I've found it more cost-effective to concentrate on receiver noise figure than higher uplink power. I often find myself lowering my power to the point where I think I'm reasonable copy only to be told 'I've slipped into the noise!'. That tell you something?"

As a further guide to uplink power, AMSAT officials advise that at no time should your downlink be stronger than the general beacon. If you can't hear the GB at least 6 dB above the noise, you should take this as a sign to get to work on that receiver front end immediately. A good-hearing station will hear the beacon 12-15 dB above the noise and a first rate 2 meter station will hear the beacon 15-20 dB above the noise. How do you compare?

If you come across a QRO station the best approach to take is likely a polite, informative chat indicating the recommended ceilings on power and the casual observation that the subject station seemed to be pressing the limits a bit. Oft time the subtle hint will suffice. You should not expect to succeed 100%, however. The incorrigible will have to wait for a more sophisticated approach.

Meanwhile, several new features have appeared on Mode B. W1AW, the ARRL station, has commenced cw bulletin service on Special Service Channel L2 (145.840) at all regularly scheduled bulletin times when AO-10 is within view of Newington. Also, AMSAT's regular Wednesday (UTC) East Coast 75 Meter Net is being simulcast on AO-10 beginning 0100 UTC every Wednesday that AO-10 is within view at net time. Downlink frequency is the AMSAT Calling and Net Frequency (ACNF) of 145.957 MHz. At approximately 0215 UTC the Westlink Amateur Radio News Service is carried on AO-10. Assisting WA2LQQ with the nets on AO-10 are W3IWI and KO5I. A roundtable discussion generally ensues after the Westlink transmission.

On 1 September another first was logged on AO-10 when the Honeywell Teleconference Radio Net (TRN) was carried on AO-10. The featured speaker on this occasion was Senator Barry Goldwater, K7UGA. The TRN was introduced to AO-10 by W3OZ who interfaced a Washington area repeater to Mode B from Mt. Airy, Maryland. The transmission was especially helpful since several repeaters around the nation lost their landline links to the net and were thus left with no program material halfway through the event. On 1 December the TRN will feature AMSAT. K8OCL has arranged with TRN director WØTN to make the December TRN a very special one indeed. It is of course hoped that AO-10 will be within view during this historic event.

Technically-oriented firsts have been claimed too amidst numerous operational firsts. NK6K claimed the first packet radio linkup—to himself! W3IWI linked up with ZL1AOX. KA9Q and WA2LQQ were monitoring with NK6K on packet through AO-10. KA9Q's orbital predictions for AO-10 must be recorded as a major first since this was the first time amateurs have been able to derive their own high-precision orbital calculations.

Despite these and other notable technical innova-

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AMSAT OSCAR-10 Frequency Conversion Chart

(Revised 9/8/83)

Revised Mode B Frequency Guide*

(Exclusive of Doppler Shift)

Uplink		Downlink	
		145.987	Engineering Beacon
435.0323	Scheduled Use	145.9720	SSC H1
435.0423	Scheduled Use	145.9620	SSC H2
435.0447		145.9600	GCB Upper Limit
435.0477		145.9570	ACNF
435.050		145.955	
.055		.950	
.060		.945	
.065		.940	
.070		.935	
.075		.930	
.080		.925	
.085		.920	
.090		.915	
.095		.910	
.100		.905	
435.1037	Center Band	145.901	
.105		.900	
.110		.895	
.115		.890	
.120		.885	
.125		.880	
.130		.875	
.135		.870	
.140		.865	
.145		.860	
.150		.855	
.155		.850	
.160		.845	GCB Lower Limit
435.1647	Scheduled Use	145.8400	SSC L2
435.1747	Scheduled Use	145.8300	SSC L1
		145.810	General Beacon

*Based on conversion frequency of 581.0047 MHz.
SSC — Special Service Channel
GCB — General Communications Band
ACNF — AMSAT Calling and Net Frequency

Preliminary Mode L Frequency Guide*

(Exclusive of Doppler Shift)

Uplink		Downlink	
1269.050		436.950	Upper Limit
.075		.925	
.100		.900	
.125		.875	
.150		.850	
.175		.825	
.200		.800	
.225		.775	
.250		.750	
.275		.725	
.300		.700	
.325		.675	
.350		.650	
.375		.625	
.400		.600	
.425		.575	
1269.450	Center Band	436.550	
.475		.525	
.500		.500	
.525		.475	
.550		.450	
.575		.425	
.600		.400	
.625		.375	
.650		.350	
.675		.325	
.700		.300	
.725		.275	
.750		.250	
.775		.225	
.800		.200	
.825		.175	
1269.850		435.150	Lower Limit
		436.040	Engineering Beacon
		436.020	General Beacon

*Based on a translation frequency of 1706.00 MHz, estimated.

Operating Notes:

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tions, it is surely the operators' day. WH6AMX claimed the first Hawaii to Europe QSO when at 0136 UTC on 11 Aug. he worked G4CBW. The first intersatellite QSO was reported by ZL1AOX. He reports ZL1HV contacted ZL2BEM on RS-6 via AO-10 with weak but copiable cw at 1031 to 1036 UTC 18 Aug. DX stations have been appearing with gratifying regularity making it fun for all. (How about A71AD on Mode B?!) Even SSTV has been reported exchanged between station in ZL and JA. RTTY QSOs are popping up too. In short, many operators are taking their favorite modes, be it cw, packet, SSTV, RTTY or plain ol' ssb and getting right at it with AO-10.

Congratulations from amateur radio societies around the globe pour in as the accomplishment embodied by AO-10 begins to sink in. A congratulatory note was even carried on the codestore of RS-5, as reported by KO5I: "Congrats to AMSAT OSCAR 10 successful operation from orbit de USSR Sputnik Group AR."

The final orbit attained has proved quite good and has provided an excellent glimpse of the potential communications AO-10 can provide. The effects of ionizing radiation have been discounted as a source of major concern. The scare controllers had when the radiation counter suddenly jumped 4,000 counts has been traced to a software glitch. Studies of anticipated future eclipses are now underway to determine when they will occur and how operational plans must be adopted to accommodate them.

Mode B continues to amaze. But there's more still to AO-10 than Mode B. There's the ultimate challenge of Mode L! And AMSAT has announced that beginning this Autumn, Mode L will be activated for up to 4 hours per week. Starting 21 Sept., Mode L will be on from one hour prior to one hour past each apogee occurring on Wednesday (UTC). That is, Wednesday-occurring apogees from minus one to plus one hour. Find the passband frequencies and beacons for Mode L in a box elsewhere in this *ASR*. The Mode B general beacon schedule/format will be revised shortly. Also, testing on 15/16 Sept. may interrupt Mode B operations those days.

With nearly three months behind it, AO-10 is beginning to fulfill the promise of these many years of planning and struggle. Many have harkened back to the brainstorming sessions between DJ4ZC and W3GEY when AO-7 was in its heyday. "Why not do Mode B on an International scale?" was the implied question. Many can now picture those first crude sheet metal models...a three pointed star was what they wanted. The star is now aloft and is called OSCAR 10...a supreme tribute to those who have carried the dream this far!

Nominees List Told

With the closing of the nomination period on 22 Aug., AMSAT HQ announces the following nominations have been accepted: John Browning, W6SP; Jan King, W3GEY; John Henry, VE2VQ; John Pronko, W6XN; John Montague, WØRUE; Wray Dudley, W8GQW. In addition, Richard Zwirko, K1HTV, had been nominated but at press time was undecided if he would be a candidate for reelection. K1HTV, W6SP, W3GEY and VE2VQ are incumbents. Ballots will be mailed soon to all current members. *ASR* is attempting to organize a short series on the candidates to better inform the members. If successful, *ASR* will publish in two succeeding issues prior to the election (probably in October) short statements from the nominees to indicate to the voters as succinctly as possible why they should get the members' vote. Watch for this next month.

Short Bursts

- Hans, ZS6AKV, has been elected President, AMSAT South Africa. Congratulations!
- New AMSAT appointments: To Area Coordinator for Maryland, Mel Brechin, N3CES. AMSAT OSCAR Spacecraft Laboratory Manager, Byron Kabron, KA3CUK. To Area Coordinator for Finland, Olli Kinnunen, OH2XN. To Area Coordinator for Northeast Ohio, Tom Bence, WB8CQW. To Area Coordinator for Australia, Graham Ratcliff, VK5AGR. Congratulations and thanks to all.
- A new launch opportunity has appeared. Good news is there's space aboard for an amateur radio package to go to low polar orbit much like AO-8. Bad news is it lifts off next March. G3YJO and colleagues have a tentative OK from NASA to get on board but schedule is great concern. Six months may not be enough to get a real satellite together. The launch was a reserve called Landsat D Prime and was originally scheduled for 1986. Problems with present Landsat made callup of D Prime necessary. G3YJO may try for advanced UoSAT with perhaps some packet capability to demonstrate PACSAT concept.
- Regarding PACSAT, VITA has agreed in principle to hire Harold Price, NK6K, as Project Manager for 6 months. This comes on the heels of a very successful meeting in Boston July 28-31 at which officials of VITA and AMSAT from around the world set down plans for PACSAT architecture. (More on this soon).
- Recent HamFest and Convention successes were logged at the Dallas HamCom where over $1200 was raised for the cause. KO5I, WB5PMR, WB1EYI, N5AHD, WDØETZ, WB9FLW and KG5U all contributed to the tremendous success. W6SP and W6XN led the AMSAT team at the Pacific Division Convention in Reno bringing in several hundred dollars in donations.
- The STS-9 Ham In Space Project is picking up steam. The frequency list has been made available as have tentative time lines for tracking. Launch day is 28 October. *ASR* will publish the frequencies and time lines in the near future as they become firm. Motorola's submission for the radio that will be used aboard Columbia by Dr. Garriott, W5LFL, was the one selected.
- The new ARRL "movie", "Amateur Radio's Newest Frontier" is now in distribution. The ARRL has several hundred copies out already. AMSAT's videotape library has a limited number of copies too. Contact WBØGAI at 1627 36th Ave. Court, Greeley, CO 80634. Specify VHS, Beta or NuMatic. A deposit of $25 is required. See also *ASR* #30. The movie features quite a number of space themes including STS-9. Featured is an interview with AMSAT's W3GEY.
- AO-8 has been out of service since early June. Doesn't

look good. Problems too are apparent with RS-3 and 4.

• First international packet radio exchange took place 27 May on 28 MHz with ZL1AOX QSOing W3IWI for a 13,850 km circuit. This record was later eclipsed by a few km when WA2LQQ QSOed with ZL1AOX on 28 MHz. Experiments on AO-10 SSC L1 have been yielding amazing results for ZL1AOX, NK6K and W3IWI.

• The JARL (Japanese Amateur Radio League) held their JARL Ham Fair 19-21 Aug. According to Miki, JR1SWB, station 8J1HAM featured live AO-10 demonstrations, a model of the JARL/JAMSAT JAS-1 satellite project was on display as well. The cover of *ORBIT* #6 was a poster at the Ham Fair a few years ago.

• AMSAT sadly noted the passing of two distinguished hams. Dr. Henry Smith, N3AEQ on 14 July. Carl Sheidler, W2AZL on 18 July. They were especially well-known and contributed much to our hobby. They will be sorely missed.

• ASE Manager Bob Diersing, N5AHD, has been elected President of the Texas VHF Society. Congratulations to Bob!

• An interesting PACSAT article appears in the September issue of *Popular Computing*, page 170. Contributions to the article came from Gary Garriott (VITA) and Phil Karn, KA9Q. Look for "Sending Data By Ham Radio" in that issue.

AMSAT Seeks Help For Specialized Tasks

From time to time certain tasks can be identified that can easily be done by someone who has an interest in helping advance AMSAT's interests. It is especially important in a volunteer-based organization such as AMSAT that a "connection" be made between the identifier of the task and a body of potential "doers". To assist in this "connection", *ASR* will be running notices of Help Wanted. These notices will generaly spell out the task, what is requested, when and the types of talent/resources generally believed required to get the task done.

On the other hand, there have been dozens of individuals who over the years have been discouraged at having volunteered a SPECEFIC talent in a letter or telephone conversation only to be disappointed at having never been called upon to perform.

Thus there really are two issues here. Finding the right person for the task is part of it. Being a "generalist" and able to work at many different things outside of your chosen field is another. For example, perhaps you are a great accountant and would like to do some accounting for AMSAT. But what if AMSAT has all the accountants it can use? Are you locked out from making a valuable contribution?

Not at all! As long as you understand that there are many different "oars" to be manned, we'll find something that will satisfy you without leaving too many splinters. To inquire about the listed jobs, call or write AMSAT HQ or other designated coordinator.

Help Wanted

Additional HF Net Control Stations preferably in the Northeast USA to join team of established pros on AMSAT Nets on 15, 20 meters. Contact W8GQW. See additional details in *ASR* #58/59

Project Manager. To manage AMSAT's Name In Space Project as described in August *QST*, page 127. Administrative duties. Contact N2CF at AMSAT HQ.

Technical Writer. To author a small brochure on "How to Use OSCAR Satellites". Brochures to be placed on amateur radio sales counters and in equipment containers. Can write clearly; thorough understanding of OSCAR satellites required. Contact N2CF at AMSAT HQ.

AO-10 Apogee Times/SSPs

Date	Apogee Time (hh:mm:ss.sss)	Apogee Longitude (deg)
Sept. 12	02:46:06.608	133.240W
12	14:25:38.104	54.442E
13	02:05:09.600	120.876W
13	13:44:41.097	63.806E
14	01:24:12.593	111.512W
14	13:03:44.090	73.170E
15	00:43:15.586	102.148W
15	12:22:47.082	82.534E
16	00:02:18.579	92.784W
16	11:41:50.075	91.898E
16	23:21:21.572	83.420W
17	11:00:53.068	101.262E
17	22:40:24.564	74.056W
18	10:19:56.061	110.626E

Notes: Time increment (Anomalistic Period) = 699.524940 minutes (Per MH-8-23). Longitude increment = 184.682 deg. east per orbit, or 9.364 deg. east per 2 orbits. Latitude of apogee for the covered period is approximately 10 deg. N.

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Satellite: oscar-10
Catalog number: 14129
Epoch time:       83236.00000000
   Wed Aug 24 00:00:00.000 1983 UTC
Element set:      MH 8-23-83
Inclination:        26.1180 deg
RA of node:        244.7970 deg
Eccentricity:     0.6038494
Arg of perigee:    197.0530 deg
Mean anomaly:       54.1010 deg
Mean motion:     2.05853990 rev/day
Decay rate:               0 rev/day^2
Epoch rev:              147
Semi major axis: 26105.693 km
Anom period:     699.524940 min
Apogee:           35491.811 km
Perigee:           3963.997 km
Translate freq:    581.0047 mhz
Invert:                   1
Beacon:            145.8100 mhz
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